UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,645	01/13/2004	Jeffrey R. Dahn	58582US003	3942

32692 7590 11/28/2007

3M INNOVATIVE PROPERTIES COMPANY
PO BOX 33427
ST. PAUL, MN 55133-3427

EXAMINER	
DOVE, TRACY MAE	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/28/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LegalUSDocketing@mmm.com
LegalDocketing@mmm.com

Office Action Summary	Application No.	Applicant(s)	
	10/757,645	DAHN ET AL.	
	Examiner	Art Unit	
	Tracy Dove	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 12-22* is/are pending in the application.

4a) Of the above claim(s) *16-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-15,21 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the communication filed on 10/12/07. Applicant's arguments have been considered, but are not persuasive. Claims 1-10 and 12-22 are pending. Claims 16-20 are withdrawn. This Action is made FINAL, as necessitated by amendment.

Claim Objections

Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-10 and 12-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites a range of "$0.025 \leq x < 0.35$", which is not supported by the specification as filed. The specification does not support an end point of less than 0.35 for x. Applicant states support is found on pages 2-3 of the specification, however, proper support has not been found by the Examiner. Examiner requests Applicant point to the specific page and lines of the specification that support the upper endpoint of the claimed range for x.

Claims 1-10 and 12-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites "a pellet density of at least 3.3 g/cm^2", which is not supported by the specification as filed. The specification discloses a pellet density of 3.3-4 g/cm^3" (page 3), but does not provide support for pellet density values greater than 4 g/cm^3. Note the unit for pellet density contained in the pending claims is incorrect, "g/cm^2" should recite "g/cm^3".

Claims 1-10 and 12-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites "the total amount of boron compound(s) is greater than 0.2% of the total weight of the mixture", which is not supported by the specification as filed. The specification discloses an amount of sintering agent of "about 0.1 to about 5.0 wt%, preferably about 0.2 to about 3.0 wt%, more preferably about 0.5 to about 1.0 wt%" (page 3), but does not provide support for sintering agent amounts greater than 5.0 wt% of the total weight of the mixture (page 3).

Claims 21 and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed

invention. Claim 21 recites "the total amount of alkali fluorides is greater than 0.2% of the total weight of the mixture", which is not supported by the specification as filed. The specification discloses an amount of sintering agent of "about 0.1 to about 5.0 wt%, preferably about 0.2 to about 3.0 wt%, more preferably about 0.5 to about 1.0 wt%" (page 3), but does not provide support for sintering agent amounts greater than 5.0 wt% of the total weight of the mixture (see page 3).

*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-10 and 12-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "boron compound(s)". There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites "the amount of sintering agent being mixed is about 0.1 to about 5.0 weight percent of the resulting mixture", which is inconsistent with independent claim 1. Similarly, claim 6 is inconsistent with claim 1 because "about 0.2" is broader than "greater than 0.2" for the low end of the claimed range for the sintering agent. Similarly, claim 8 is inconsistent with claim 1 because "less than about 10" encompasses values lower than "greater than 0.2".

Numerous claims recite the phrase "at least about", which is indefinite. Examiner suggests the term "about" be deleted.

Claims 9 and 10 recite the limitation "the resulting densified composition". There is insufficient antecedent basis for this limitation in the claim.

Claim 10 recites "72 percent of theoretical density", which is indefinite because it is unclear how the theoretical density is determined.

Claims 12 and 13 are improper because "alkali metal fluoride" and "LiF" are not boron compounds and claim 1 requires the sintering agent to be a boron compound.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-10, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula $Li_xMn_aNi_bCo_cO_2$ with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of $LiMn_{0.35}Ni_{0.42}Co_{0.23}O_2$, among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027). The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Thus the claims are anticipated. The pellet density of claim 1 and the properties recited by claim 9 and 10 of the produced Li-Ni-Co-Mn-oxide compound are considered inherent in view of the teachings of Shiozaki.

*

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over, Kang et al., US 7,205,072 B2.

Kang teaches a cathode material for a lithium ion rechargeable battery. The cathode material has the formula $Li_{1+x}Ni_\alpha Mn_\beta Co_\gamma M'_\delta O_{2-z}F_z$ wherein x is between 0 and 0.3, α is between about 0.2 and 0.6, β is between about 0.2 and 0.6, γ is between about 0 and 0.3, δ is between about 0 and 0.15, and z is between about 0 and 0.2 (abstract). To prepare the $Li_{1+x}Ni_\alpha Mn_\beta Co_\gamma M'_\delta O_{2-z}F_z$ compound, appropriate amounts of lithium hydroxide (or lithium carbonate), lithium fluoride and Ni-Mn-Co-hydroxide are mixed. The mixture is calcined at

450-550°C for 12-30 hours in air and then at 900-1000°C for 10-24 hours in either air or oxygen containing atmosphere (3:17-24). Claims 21 and 22 recite properties of the produced Li-Ni-Co-Mn-oxide compound, which are considered inherent in view of the teachings of Kang.

Kang does not explicitly state the amount of sintering agent added to the mixture to prepare the cathode active material compound.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Kang teaches an appropriate amount of lithium fluoride may be added to the mixture depending on the desired compound oxide to be produced. Furthermore, Figure 4 teaches and suggest varying the amount of LiF in the mixture to produce various compound oxide cathode active materials. Figure 4 at least suggest 2% of LiF was added to the mixture. Furthermore, the courts have ruled where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. The courts have held that a limitation merely with respect to proportions in a composition of matter or process will not support patentability unless such limitation is "critical". Minerals Separation, Ltd. v. Hyde, 242 U.S. 261 (1916). Furthermore, the courts have ruled that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

*

Claims 4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula $Li_xMn_aNi_bCo_cO_2$ with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of $LiMn_{0.35}Ni_{0.42}Co_{0.23}O_2$, among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027). The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Shiozaki does not explicitly teach the mixture is heated for at least about 6 hours. However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because heat treating for at least 6 hours is considered obvious in view of the teaching by Shiozaki to heat treat for 5 hours. Note claims 9 and 10 are considered inherent in view of the teachings of Shiozaki.

Response to Arguments

Applicant's arguments filed 10/12/07 have been fully considered but they are not persuasive.

Applicant argues Shiozaki teaches $LiMn_{0.35}Ni_{0.42}Co_{0.23}O_2$ that has quite different molar amount of Ni and Mn when compared to the formula of pending claim 1. However, Shiozaki is not limited to any particular compound, but has a general disclosure of a positive electrode active material for a secondary battery having the formula $Li_xMn_aNi_bCo_cO_2$ with a, b and c represented

by the Figure shown with the abstract. Applicant argues Shiozaki teaches a transition metal mixed metal hydroxide may be used as a raw material or a precursor and points to paragraph [0023] which Applicant asserts suggests that three different transition metal compounds were mixed before heat treatment. In contrast to the claimed invention requiring mixing the combination metal oxide with LiOH or Li_2CO_3. However, this argument is confusing and not commensurate in scope with the claimed invention. The claims require mixing a combination metal hydroxide (not oxide) with LiOH or Li_2CO_3. Furthermore, arguing how the transition metal mixed hydroxide of Shiozaki is obtained is not relevant to the claimed invention because the pending claims to not limit how the combination metal hydroxide is obtained. Regarding the obviousness rejection, Applicant argues the Examiner provides an unsupported conclusion that contradicts all motivation in the art to reduce sintering times to the minimum feasible. However, Applicant has not provided any support or evidence that "all motivation in the art" is to "reduce sintering times".

Applicant's arguments regarding Kang are moot. Only new claims 21 and 22 are rejected in view of Kang.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

November 20, 2007